TABLE OF CONTENTS

		Page
ΕX	XECUTIVE SUMMARY	ES-1
	Purpose and Goals	ES-2
	Model Selection	
	Episode Selection.	
	Summary of Modeling Approach and Results	
	Future Work	
1.	INTRODUCTION	1-1
	Background	1-2
	Purpose and Objectives of this Study	1-4
2.	EPISODE SELECTION	2-1
	Episode Representativeness	2-2
	Description of Episodes	
	Databases for the Episodes	
	CCOS 2000 Field Study Data QA/QC And Preliminary Analysis	2-59
3.	MODEL SELECTION	3-1
	Challenges of the Study	3-1
	Selected Modeling Systems	3-2
4.	METEOROLOGICAL MODELING	4-1
	RAMS Applications	4-1
	MM5 Applications	4-19
5.	EMISSIONS MODELING	5-1
	Emission Models	5-1
	Emissions Estimates from CARB for the CCOS Period	
	Future Year Emissions Estimates	5-6
	Emissions Summary	5-7
6.	CAMX INPUT DATA PREPARATION	6-1
	CAMx Domain and Grid Specifications	
	Emissions Processing	
	Meteorological Processing.	
	Development of Ancillary Inputs	
	CAMx Model Options	6-14

7.	BASE Y	EAR MODEL APPLICATION	7-1
	Summary	of CAMx Simulations Performed	7-1
		on of VOC Performance	
	Use of th	e Process Analysis Tool	. 7-22
	Use of th	e Decoupled Direct Method for July 1999	. 7-30
	BAAQM	D CAMx Applications for CCOS 2000	. 7-44
	BAAQM	D CAMx Applications for July 1999	. 7-56
8.	CONCL	USION	8-1
		<i>I</i>	
	Future W	ork	. 8-11
RE	EFERENC	CES	R-1
		TABLES	
		TABLES	
Tal	ble 2-1.	Ozone (ppb) by site on District days exceeding the national 124 ppb 1-hour ozone standard, 1995 through September 2002	2.4
T_{0}	ble 2-2.	Number of 1-hour exceedances (District maximum) by site,	∠-4
Tai	016 2-2.	1995 through September 2002	2.5
Tal	ble 2-3.	Number of 1-hour exceedances by year, subregion, number	2-3
ıaı	UIC 2-3.	of areas, and episode length, 1995 through September 2002	2-5
Tal	ble 2-4.	Ozone and meteorological summary statistics: medians by	2-3
1 a	UIC 2-4.	cluster and values by key exceedance day	2-11
Tal	ble 2-5.	The ratios of the number of back trajectories passing	. 2 11
1 4	010 2 3.	through the Bay Area to the total number computed. The 24- and	
		48-hour columns indicate the ratios for the 24- and 48-hour back trajectories.	
		respectively. Sacramento Valley includes Stockton area.	,
		San Joaquin Valley includes Merced County area	2-35
Tal	ble 2-6.	Hourly ozone concentration measured at sites recording	. 2 33
1 4.	010 2 0.	at least one exceedance value during the July 11-12, 1999 episode.	
		Yellow shading denotes 1-hour exceedances	2-40
Tal	ble 2-7.	Hourly ozone concentration measured at sites recording	
1 00.	010 2 7.	at least one exceedance value during the July 31- August 2, 2000	
		episode. Yellow shading denotes 1-hour exceedances	. 2-41
Tal	ble 2-8.	Dates and times of offshore aircraft measurements used to	
1 00.	010 2 0.	estimate boundary conditions for photochemical modeling	. 2-60
Tal	ble 2-9.	Carbon-Bond IV mechanism representation of western boundary condition	
Tal	ble 4-1.	Grid parameters for each of the nested domains shown in Figure 4-2	4-4
Tal	ble 5-1.	Comparison of July-August 2000 and July 1999 CB-IV	
		emissions estimates (tons per day)	5-9
Tal	ble 5-2.	Results of speciating TOG using CARB CB-IV speciation	
		profiles (tons per day)	. 5-10

Table 5-3.	Results of speciating TOG using EPA CB-IV speciation	11
Table 5 4	profiles (tons per day)	-11
Table 5-4.	Difference between CB-IV speciated emissions estimates	12
	(d = EPA - CARB), in tons per day	-12
Table 6-1.	CAMx meteorological input data requirements	6-5
Table 6-2.	UCR SARMAP-based ozone profiles (ppm) by CAMx layer	6-7
Table 6-3.	SARMAP VOC Concentrations in the lowest 1 km (ppb).	6-9
m 11 m 1		
Table 7-1.	Emission scaling factors applied by air basin to the	
	July/August 2000 CCOS emissions inventory to match	7.2
T. 11. 7. 0	totals given by Harley (2003).	7-3
Table 7-2.	Compilation of observed and predicted 6-9 AM VOC and	
	NOx concentrations at sites with co-located monitors in the	
	CCOS air quality database. Data from both 1- and 3-hour	
	instruments are shown for days in which data were available.	
	Differences between observations and predictions greater than	
	30% are depicted in red	
Table 7-3.	Model performance statistics for Run 3	-45
	FIGURES	
Figure 2-1.	Numbers of exceedances by day of week, 1995 through September 2002	2-5
Figure 2-2.	Numbers of exceedances by month, 1995 through September 2002	
Figure 2-3.	Trends in exceedances of the federal 1-hour ozone standard	
115010 2 3.	1982-91 vs. 1992-2001	2-8
Figure 2-4.	Clustering of Bay Area days exceeding the national 1-hour	
C	ozone standard, 1995 through September 2002. Thick, horizontal	
	lines divide the three main clusters	2-9
Figure 2-5.	Boxplots of daily maximum ozone by cluster. Boxes	
E	(rectangles) show 25 th and 75 th percentiles. Horizontal lines	
	in the boxes are medians. Vertical lines above and below the	
	boxes indicate the range of the data unless there are outliers.	
	Outliers are shown with asterisks (see Figure 2-6)	-11
Figure 2-6.	Boxplots of mean 1-hour ozone maxima for the 21 sites,	
8	by cluster, 1995 through September 20022	-12
Figure 2-7.	850 mb 4 PM wind directions at Oakland by cluster, 1995	
8	through September 2002. A line is drawn at 180° for reference	-12
Figure 2-8.	Back trajectories ending at Livermore at 2 PM July 11, 1999.	
E	The red line (with triangles) is the surface trajectory at 2 m.	
	The blue line (with square) is the trajectory at 500 m.	
	The green line (with circle) is the trajectory at 1000 m.	
	The time is shown in UTC. To convert to PST, subtract 8 hours from UTC 2	-14
Figure 2-9.	Same as Figure 2-8 except for San Martin	
Figure 2-10.	Bay area surface-wind observations at 7 AM PST, July 11, 1999.	
	The numbers are temperature and dew point temperature	-17
Figure 2-11	Bay area surface-wind observations at 2 PM PST, July 11, 1999.	
_	The numbers are temperature and dew point temperature	-18

Figure 2-12.	Bay area surface-wind observations at 7 AM PST, July 12, 1999.	
_	The numbers are temperature and dew point temperature	2-19
Figure 2-13.	Bay area surface-wind observations at 2 PM PST, July 12, 1999.	
	The numbers are temperature and dew point temperature	2-20
Figure 2-14.	Bay area surface-wind observations at 7 AM PST, June 15, 2000.	
	The numbers are temperature and dew point temperature	2-21
Figure 2-15.	Bay area surface-wind observations at 2 PM PST, June 15, 2000.	
	The numbers are temperature and dew point temperature	2-22
Figure 2-16.	Bay area surface-wind observations at 7 AM PST, July 31, 2000.	
	The numbers are temperature and dew point temperature	2-23
Figure 2-17.	Bay area surface-wind observations at 2 PM PST, July 31, 2000.	
	The numbers are temperature and dew point temperature	2-24
Figure 2-18.	Bay area surface-wind observations at 7 AM PST, July 9, 2002.	
-	The numbers are temperature and dew point temperature	2-25
Figure 2-19.	Bay area surface-wind observations at 2 PM PST, July 9, 2002.	
	The numbers are temperature and dew point temperature	2-26
Figure 2-20.	Bay area surface-wind observations at 7 AM PST, July 10, 2002.	
T' 0.01	The numbers are temperature and dew point temperature	2-27
Figure 2-21.	Bay area surface-wind observations at 2 PM PST, July 10, 2002.	2.20
T: 0.00	The numbers are temperature and dew point temperature	
Figure 2-22.	The 24-hour back trajectories for the July 11-12, 1999 episode	
Figure 2-23.	The 24-hour back trajectories for the June 16, 2000 episode	
Figure 2-24.	The 24-hour back trajectories for the July 31, 2000 episode	
Figure 2-25.	The 24-hour back trajectories for the July 9-10, 2002 episode	
Figure 2-26.	Daily maximum observed ozone from 6/1/1999 to 10/1/1999	
Figure 2-27.	Daily maximum observed ozone from 6/1/2000 to 10/1/2000	2-39
Figure 2-28.	Spatial distribution of daily maximum ozone observations	2 42
E: 2.20	greater than 120 ppb (red) for 7/11/1999	2-42
Figure 2-29.	Spatial distribution of daily maximum ozone observations	2 42
E: 2.20	greater than 120 ppb (red) for 7/12/1999	2-43
Figure 2-30.	Spatial distribution of daily maximum ozone observations	2 44
E: 2.21	greater than 120 ppb (red) for 6/15/2000	2-44
Figure 2-31.	Spatial distribution of daily maximum ozone observations	2.45
E: 2.22	greater than 120 ppb (red) for 7/31/2000	2-45
Figure 2-32.	Ozone time series at the two SFBA stations with the highest	2.46
Eigung 2 22	ozone observations during 7/11-12/1999	2-46
Figure 2-33.	Ozone time series at the two SFB stations with the highest	2.47
Eigung 2 24	ozone observations during 6/15/2000	2-4/
Figure 2-34.	Ozone time series at the two SFB stations with the highest	2 40
Figure 2 25	ozone observations during 7/31/2000	2 50
Figure 2-35.	500 mb heights at Oakland from 6/1/1999 to 10/1/1999	
Figure 2-36. Figure 2-37.	850mb temperatures at Oakland from 6/1/2000 to 10/1/2000	
Figure 2-37. Figure 2-38.	500 mb heights at Oakland from 6/1/2000 to 10/1/2000	
Figure 2-38. Figure 2-39.	Plan view of ozone measurements from aircraft during	2-33
1 1guit 2-39.	July through September 2000. Dashed lines show the	
	cutoff for data considered for setting the western and	
	southern boundary conditions	2-61
	DOMINIO OUMIGM F COMMINION	🚄 🗘 1

Figure 2-40.	Elevation view (looking west) of all far-offshore ozone	
	measurements sampled from aircraft during July through September 2000 2	2-62
Figure 2-41.	Plan view of NOy measurements from aircraft during	
	July through September 2000. Dashed lines show the cutoff	
	for data considered for setting the western and southern	
	>	2-63
Figure 2-42.	Elevation view (looking west) of all far-offshore	
	NOy measurements sampled from aircraft during	
	July through September 2000	2-64
Figure 2-43.	Plan view of NO measurements from aircraft during	
	July through September 2000. Dashed lines show the	
	cutoff for data considered for setting the western and	
	southern boundary conditions	2-65
Figure 2-44.	Elevation view (looking west) of all far-offshore NO	
	measurements sampled from aircraft during July through September 2000?	2-66
Figure 2-45.	Oblique 3-D view of the paraffinic-bond (PAR)	
	component of NMOC measurements from aircraft during	
	July through September 2000. Black vertical lines show	
	1, 2, and 3 km heights for reference	2-67
Figure 2-46.	Oblique 3-D view of the formaldehyde (FORM)	
_	component of NMOC measurements from aircraft during	
	July through September 2000. Black vertical lines show	
	1, 2, and 3 km heights for reference.	2-68
Figure 4-1.	The coverage of the CARB/CCOS air quality modeling	
riguic 4-1.	domain. Grid spacing over the entire region is 4 km. Map	
	projection is Lambert Conformal	1 3
Figure 4-2.	Depiction of the RAMS rotated polar stereographic modeling	. 4-3
11guic 4-2.	grid configuration, which employed a system of up to four	
	nested grids with successively finer resolution	1 1
Figure 4.2	Vertical grid structure used for RAMS.	
Figure 4-4.		. 4-3
rigule 4-4.	Locations of meteorological observation sites within the CCOS database. Site colors show the break out of these sites	
	within each sub-regional analysis zone. These sites include	
	NWS, AIRS, CIMIS, RAWS, certain private networks, and	4.0
E: 4.5	special CCOS intensive operating sites.	. 4-9
Figure 4-5.	Time-height cross-sections of virtual temperature (°C) and	
	winds at the Richmond profiler site on JD 213. Top panel	4 07
E' 4.6	shows the observations, middle panel Run 1, and bottom panel Run 2	4-2/
Figure 4-6.	Time-height cross-sections of virtual temperature (°C)	
	and winds at the Sacramento profiler site on JD 213. Top panel	
T: 4.5	shows the observations, middle panel Run 1, and bottom panel Run 2	4-28
Figure 4-7.	Time-height cross-sections of virtual temperature (°C) and	
	winds at the Bakersfield profiler site on JD 213. Top panel shows	
	the observations, middle panel Run 1, and bottom panel Run 2	4-29

Figure 4-8.	Time series of the Area 3 (San Francisco Bay area) average surface meteorology that are arranged from the top panel down:
	10-m wind speed (ms-1); 10-m wind direction; 2-m temperature
	(°C); and 2 m dewpoint temperature (°C). Black line is the
	observed average, red line is the Run1 average and the
	blue line is the Run 2 average
Figure 4-9.	Time series of the Area 5 (the northern San Joaquin Valley)
	average surface meteorology that are arranged from the
	top panel down: 10-m wind speed (ms-1); 10-m wind direction;
	2-m temperature (°C); and 2 m dewpoint temperature (°C).
	Black line is the observed average, red line is the Run1
	average and the blue line is the Run 2 average
Figure 4-10.	Time series of the Area 6 (the central San Joaquin Valley)
	average surface meteorology that are arranged from the top
	panel down: 10-m wind speed (ms-1); 10-m wind direction;
	2-m temperature (°C); and 2 m dewpoint temperature (°C).
	Black line is the observed average, red line is the Run1 average
Eigyma 4 11	and the blue line is the Run 2 average. 4-33
Figure 4-11.	Time series of the Area 7 (the southern San Joaquin Valley)
	average surface meteorology that are arranged from the top
	panel down: 10-m wind speed (ms-1); 10-m wind direction; 2-m temperature (°C); and 2 m dewpoint temperature (°C).
	Black line is the observed average, red line is the Run1 average
	and the blue line is the Run 2 average
Figure 4-12.	Time series of the Area 3 (the San Francisco Bay Area)
1 1guic + 12.	average surface meteorology that are arranged from the top
	panel down: 10-m wind speed (ms-1); 10-m wind direction;
	2-m temperature (°C); and 2 m dewpoint temperature (°C).
	Black line is the observed average, red line is the Run1 average
	and the blue line is the Run 3 average4-35
Figure 4-13.	Time series of the Area 5 (the northern San Joaquin Valley)
	average surface meteorology that are arranged from the top
	panel down: 10-m wind speed (ms-1); 10-m wind direction;
	2-m temperature (°C); and 2 m dewpoint temperature (°C).
	Black line is the observed average, red line is the Run1 average
	and the blue line is the Run 3 average4-36
Figure 4-14.	Time series of the Area 6 (the central San Joaquin Valley)
	average surface meteorology that are arranged from the
	top panel down: 10-m wind speed (ms-1); 10-m wind direction;
	2-m temperature (°C); and 2 m dewpoint temperature (°C).
	Black line is the observed average, red line is the Run1 average
T' 4.15	and the blue line is the Run 3 average
Figure 4-15.	Time series of the Area 7 (the southern San Joaquin Valley)
	average surface meteorology that are arranged from the top
	panel down: 10-m wind speed (ms-1); 10-m wind direction;
	2-m temperature (°C); and 2 m dewpoint temperature (°C).
	Black line is the observed average, red line is the Run1 average and the blue line is the Run 3 average
	and the olde line is the ixun 3 avelage

Figure 4-16.	The observed and simulated boundary layer depths from Run1 and Run2, averaged over the central portion of the Central Valley	4-40
Figure 4-17.	MM5 performance for (a) winds, (b) temperature, and (c)	
118010 1177	humidity in the SFBA analysis region, for Run 1 (yellow triangles),	
	Run 2 (blue stars), and Run 3 (red squares)	4-41
Figure 4-18.	MM5 performance for (a) winds, (b) temperature, and (c)	
118010 1101	humidity in the Sacramento analysis region, for Run 1 (yellow	
	triangles), Run 2 (blue stars), and Run 3 (red squares)	4-42
Figure 4-19.	MM5 performance for (a) winds, (b) temperature, and (c)	2
riguie i i).	humidity in the central SJV analysis region, for Run 1 (yellow	
	triangles), Run 2 (blue stars), and Run 3 (red squares)	4-44
Figure 4-20.	MM5 performance for (a) winds, (b) temperature, and (c)	
115010 120.	humidity in the southern SJV analysis region, for Run 1 (yellow	
	triangles), Run 2 (blue stars), and Run 3 (red squares)	4-45
Figure 4-21.	Site-averaged time series of wind speed, direction, and	+ +3
115010 1 21.	temperature for the SFBA over the July 9-12, 1999 modeling	
	period. Observations are shown in bold black, and various MM5	
	simulations are shown as thinner colored traces	4_47
Figure 4-22.	MM5 performance for (a) winds and (b) temperature in the	¬-¬/
1 iguic 4-22.	SFBA analysis region. Circled points indicate performance	
	specifically on July 11 and 12	1_18
Figure 4-23.	Site-averaged time series of wind speed, direction, and	
1 iguic 4-25.	temperature for the Sacramento area over the July 9-12, 1999	
	modeling period. Observations are shown in bold black, and various	
	MM5 simulations are shown as thinner colored traces	4-49
Figure 4-24.	MM5 performance for (a) winds and (b) temperature in the	T T
1 iguic 4-24.	Sacramento analysis region	4-51
Figure 4-25.	Site-averaged time series of wind speed, direction, and	T -J1
1 1guit + 25.	temperature for the central SJV area over the July 9-12, 1999	
	modeling period. Observations are shown in bold black, and various	
	MM5 simulations are shown as thinner colored traces	4-52
Figure 4-26.	MM5 performance for (a) winds and (b) temperature in the	7-32
1 iguic 4-20.	central SJV analysis region	4-53
Figure 4-27.	Site-averaged time series of wind speed, direction, and	+ 33
1 iguic 4-27.	temperature for the southern SJV area over the July 9-12, 1999	
	modeling period. Observations are shown in bold black, and various	
	MM5 simulations are shown as thinner colored traces	4-54
Figure 4-28.	MM5 performance for (a) winds and (b) temperature in the	3-
11guic 4-26.	southern SJV analysis region.	1-55
Figure 4-29.	Site-averaged time series of wind speed, direction, and	7-33
11guic 4-2).	temperature for the central SJV area over the July 9-12, 1999	
	modeling period. Observations are shown in bold black, the	
	MM5 Eta PBL run is shown in red, and the MM5 MRF PBL	
	run is shown in yellow	4-56
Figure 4-30.	MM5 performance for (a) winds and (b) temperature in the	7-50
1 1guit 7-50.	central SJV analysis region for the BAAQMD MM5 Eta	
	and MM5 MRF simulations	4-57
	MILE ITELES ITELES AND	

Figure 5-1.	Daily area source emissions estimates for Sunday,	
	30-July-2000. (a) VOC. (b) NOX	5-13
Figure 5-2.	Daily area source emissions estimates for Monday,	
	31-July-2000. (a) VOC. (b) NOX	5-14
Figure 5-3.	Daily biogenic emissions estimates for Sunday,	
	30-July-2000. (a) VOC. (b) NOX	5-15
Figure 5-4.	Daily biogenic emissions estimates for Monday,	
	31-July-2000. (a) VOC. (b) NOX	5-16
Figure 5-5.	Daily commercial shipping emissions estimates for	
	Sunday, 30-July-2000. (a) VOC. (b) NOX	5-17
Figure 5-6.	Daily commercial shipping emissions estimates for	
	Monday, 31-July-2000. (a) VOC. (b) NOX	5-18
Figure 5-7.	Daily electric generating utility emissions estimates for	
_	Sunday, 30-July-2000. (a) VOC. (b) NOX	5-19
Figure 5-8.	Daily electric generating utility emissions estimates for	
C	Monday, 31-July-2000. (a) VOC. (b) NOX	5-20
Figure 5-9.	Daily other stationary source emissions estimates for	
8	Sunday, 30-July-2000. (a) VOC. (b) NOX	5-21
Figure 5-10.	Daily other stationary source emissions estimates for	
118010010	Monday, 31-July-2000. (a) VOC. (b) NOX	5-22
Figure 5-11.	Daily off-road mobile source emissions estimates for	22
115010 5 11.	Sunday, 30-July-2000. (a) VOC. (b) NOX	5-23
Figure 5-12.	Daily off-road mobile source emissions estimates for	5 25
1 iguic 3-12.	Monday, 31-July-2000. (a) VOC. (b) NOX	5-24
Figure 5-13.	Daily on-road mobile source emissions estimates for	5-24
11guic 3-13.	Sunday, 30-July-2000. (a) VOC. (b) NOX	5 25
Figure 5-14.	Daily on-road mobile source emissions estimates for	3-23
11guic 3-14.	Monday, 31-July-2000. (a) VOC. (b) NOX	5 26
Figure 5 15		3-20
Figure 5-15.	Daily area source emissions estimates for sunday,	5 27
Figure 5 16	11-July-1999. (a) VOC. (b) NOX	3-27
Figure 5-16.	Daily area source emissions estimates for Monday,	5 20
Figure 5 17	12-July-1999. (a) VOC. (b) NOX	
Figure 5-17.	Daily biogenic emissions estimates for Sunday,	
T' # 10	11-July-1999. (a) VOC. (b) NOX	5-29
Figure 5-18.	Daily biogenic emissions estimates for Monday,	7.2 0
T' 7.10	12-July-1999. (a) VOC. (b) NOX	5-30
Figure 5-19.	Daily commercial shipping emissions estimates for	
	Sunday, 11-July-1999. (a) VOC. (b) NOX	5-31
Figure 5-20.	Daily commercial shipping emissions estimates for	
	Monday, 12-July-1999. (a) VOC. (b) NOX	5-32
Figure 5-21.	Daily electric generating utility emissions estimates for	
	Sunday, 11-July-1999. (a) VOC. (b) NOX	5-33
Figure 5-22.	Daily electric generating utility emissions estimates for	
	Monday, 12-July-1999. (a) VOC. (b) NOX	5-34
Figure 5-23.	Daily other stationary source emissions estimates for	
	Sunday, 11-July-1999. (a) VOC. (b) NOX	5-35
Figure 5-24.		
	Monday, 12-July-1999. (a) VOC. (b) NOX	5-36

Figure 5-25.	Daily off-road mobile source emissions estimates for Sunday, 11-July-1999. (a) VOC. (b) NOX	5-37
Figure 5-26.	Daily off-road mobile source emissions estimates for Monday, 12-July-1999. (a) VOC. (b) NOX	
Figure 5 27	Daily on-road mobile source emissions estimates for	
Figure 5-27.	Sunday, 11-July-1999. (a) VOC. (b) NOX	5 20
Figure 5-28.	Daily on-road mobile source emissions estimates for	3-39
11guic 3-26.	Monday, 12-July-1999. (a) VOC. (b) NOX	5-40
	Wollday, 12-3uly-1999. (a) VOC. (b) IVOA	
Figure 6-1.	The coverage of the CARB/CCOS air quality modeling domain.	
riguic o r.	Grid spacing over the entire region is 4 km. Map projection	
	is Lambert Conformal	6-2
Figure 6-2.	Scheme to assign various CAMx domain boundary segments	0 2
115010 0 2.	for regional influences.	6-7
Figure 6-3.	Episode-mean diurnal ozone profiles at Lancaster and for the	0 7
118010 0 0.	average over all sites in Santa Barbara County (coastal average)	6-8
Figure 6-4.	Distribution of "clean" and "dirty" zones for the assignment	
1180110	of initial conditions for the July/August 2000 episode. Shown	
	is the RAMS-based CAMx modeling grid, but the same pattern	
	was applied to the MM5-based CAMx grid.	6-11
Figure 6-5.	Relative contributions at the surface from initial (IC),	
8	western BC (BCWST) and northern BC (BCNTH) in the	
	RAMS/CAMx grid system from an inert tracer simulation	6-13
	g,	
Figure 7-1.	Total VOC measurements and predictions at three	
C	1-hour GC-MS sites in the CCOS domain	7-11
Figure 7-2.	Total VOC measurements and predictions at five 3-hour	
_	canister sites in the SFBA region	7-11
Figure 7-3.	Total VOC measurements and predictions at two 3-hour	
	canister sites in the SAC (SGS) and SJV (TSM) regions	7-12
Figure 7-4.	CB-IV speciated measurements and predictions at the	
	Sunol 1-hour GC-MS site on July 31	7-12
Figure 7-5.	CB-IV speciated measurements and predictions at the	
	Sunol 1-hour GC-MS site averaged over July 30 – August 1	7-13
Figure 7-6.	CB-IV speciated measurements and predictions at the	
	Sunol 3-hour canister site on July 31	7-13
Figure 7-7.	CB-IV speciated measurements and predictions at the	
	Bodega Bay 3-hour canister site on July 31	7-15
Figure 7-8.	CB-IV speciated measurements and predictions at the	
	San Leandro 3-hour canister site on July 31	7-15
Figure 7-9.	CB-IV speciated measurements and predictions at the	
	Bethel Island 3-hour canister site on July 31	7-16
Figure 7-10.	CB-IV speciated measurements and predictions at the	
	Patterson Pass 3-hour canister site on July 31	7-16
Figure 7-11.	CB-IV speciated measurements and predictions at the	
	Granite Bay 1-hour GC-MS site on August 1	7-17
Figure 7-12.	CB-IV speciated measurements and predictions at the	
	San Andreas 3-hour canister site on August 1	7-17

Figure 7-13.	CB-IV speciated measurements and predictions at the Parlier 1-hour GC-MS site on August 1	7_18
Figure 7-14	CB-IV speciated measurements and predictions at the	
Figure 7-15	Turlock 3-hour canister site on August 1(A) The location of the 640 km ² sub-domain, outlined in black,	. /-18
118010 / 10	used by the process analysis tool for the northern source region.	
	(B) A close up view of the sub-domain. The black dots	
	represent the lower left corner of the 4 km CAMx grid cells.	
	Observed data was used from the monitor stations that are	
	highlighted on the map(A) The location of the 640 km² sub-domain, outlined in black,	. 7-23
Figure 7-16		
	used by the process analysis tool for the southern ozone region.	
	(B) A close up view of the sub-domain. The black dots represent	
	the lower left corner of the 4 km CAMx grid cells. Observed data	7.05
E: 7.17	was used from the monitor stations that are highlighted on the map	. 7-25
Figure 7-17	The evolution of the mixing height within the process analysis	
	sub-domain for the (A) northern and (B) southern region. The	
	x-axis represents the hours of the simulation day and the modeling	
	height is shown vertically. The black horizontal grid lines	
	represent the CAMx grid layers and the red line is the mixing height.	
	The light blue and yellow boxes show the layers that were	7.26
Eigung 7 10	entrained and detrained, respectively	. /-20
Figure 7-18	Ozone model concentrations and the processes that contribute	
	to the final concentration for the northern ozone region. Observed data are shown from three monitor stations	
	(BTI, KRE, PBG) as one hour averages	7 27
Figure 7-19	Ozone model concentrations and the processes that	. /-2/
riguic /-i/	contribute to the final concentration for the southern ozone region.	
	Observed data is shown from two Livermore monitor stations	
	(LVF,LVR1) as one hour averages	7-27
Figure 7-20.	Ozone production diagram including radical and NOx	. , _ ,
118010 / 20.	cycles in the northern source region for hours 8-18	. 7-28
Figure 7-21.	Ozone production diagram including radical and NOx	
8	cycles in the southern ozone region for hours 8-18	. 7-29
Figure 7-22.	Simulated ozone (ppm) in the CCOS modeling domain	
C	at 3 PM local time on July 11, 1999 using the CARB CAMx configuration	7-32
Figure 7-23.	DDM ozone sensitivity coefficient field for northern	
	boundary ozone at 3 PM local time on July 11, 1999	7-33
Figure 7-24.	DDM ozone sensitivity coefficient field for northern	
	boundary VOC at 3 PM local time on July 11, 1999	7-34
Figure 7-25.	DDM ozone sensitivity coefficient field for northern	
	boundary CO at 3 PM local time on July 11, 1999	. 7-35
Figure 7-26.	Total DDM ozone sensitivity coefficient field for	
	northern and top boundary conditions (all species) at 3 PM	
	local time on July 11, 1999	. 7-37
Figure 7-27.	Total DDM ozone sensitivity coefficient field for	
	northern and top boundary conditions (all species) normalized	
	by the total ozone field at 3 PM local time on July 11, 1999	
Figure 7-28.	Definition of source regions for the CAMx DDM application	7-39

E: 7.00		
Figure 7-29.	DDM ozone sensitivity coefficient field for anthropogenic and	7.20
Figure 7-30.	biogenic NOx emissions at 3 PM local time on July 11, 1999	/-39
11guic /-30.	and biogenic VOC emissions at 3 PM local time on July 11, 1999	7-40
Figure 7-31.	DDM ozone sensitivity coefficient field for (a) total NOx	/-40
riguic / 31.	emissions from the Bay Area and (b) total NOx emissions	
	from Sacramento at 3 PM local time on July 11, 1999	7-40
Figure 7-31.	(Continued) DDM ozone sensitivity coefficient field for	,
118010 / 010	(c) total NOx emissions from the northern SJV and (d) total	
	NOx emissions from the central SJV at 3 PM local time on July 11, 1999	7-41
Figure 7-31.	(Concluded) DDM ozone sensitivity coefficient field for	
S	(e) total NOx emissions from the southern SJV at 3 PM local	
	time on July 11, 1999	7-41
Figure 7-32.	DDM ozone sensitivity coefficient field for (a) total VOC	
C	emissions from the Bay Area and (b) total VOC emissions	
	from Sacramento at 3 PM local time on July 11, 1999	7-42
Figure 7-32.	(Continued) DDM ozone sensitivity coefficient field for	
	(c) total VOC emissions from the northern SJV and (d) total	
	VOC emissions from the central SJV at 3 PM local time on July 11, 1999	7-43
Figure 7-32.	(Concluded) DDM ozone sensitivity coefficient field for	
	(e) total VOC emissions from the southern SJV at 3 PM	
	local time on July 11, 1999	7-43
Figure 7-33.	Simulated ozone distribution in Run 3 over the CCOS domain	
	at 1600 PST, July 31, 2000.	7-46
Figure 7-34.	Scatter plot of observed and simulated ozone with Run 3	
	meteorological inputs for July 31 (crosses), August 1 (circles),	
	and August 2 (triangles)	
Figure 7-35.	The wind distribution in the SFBA at 1400 PST, July 31, 2000	7-48
Figure 7-36.	The simulated ozone distribution over the SFBA for Run 3	
	at 1600 PST, July 31, 2000.	7-48
Figure 7-37.	The simulated ozone distribution over the SFBA for	7 40
F: 7.20	Run 3 at 1600 PST, July 31, 2000, with wind vectors overlaid	
Figure 7-38.	As in Figure 7-37, but for Run 1	
Figure 7-39.	As in Figure 7-37, but for Run 2	7-50
Figure 7-40.	Scatter plots of the observed and the simulated ozone	7.50
Figure 7 41	in the SFBA for Run 1 (circles), Run 2 (triangles), and Run 3 (crosses)	/-50
Figure 7-41.	The normalized bias, error and the unpaired peak prediction	
	accuracy of ozone on July 31, 2000 for Run 3 (Eta-5layer),	7.52
Figure 7-42.	Run 1 (Eta-LSM) and Run 2 (Eta-LSM, FDDA)	1-32
11guic /-42.	BAAQMD Run 3 using both CB-IV and SAPRC99 chemical	
	mechanisms. Statistics for the SFBA region	7-53
Figure 7-43.	Daily photochemical model performance statistics for the	1-33
riguic / 13.	BAAQMD Run 3 using both CB-IV and SAPRC99 chemical	
	mechanisms. Statistics for the Sacramento region	7-54
Figure 7-44.	Daily photochemical model performance statistics for the	, 01
<i>6</i>	BAAQMD Run 3 using both CB-IV and SAPRC99 chemical	
	mechanisms. Statistics for the entire SJV region	7-55

Figure 7-45.	CAMx/SAPRC99 simulated ozone on July 11, 1999 at 1400 PST	
	(a) over the entire domain and (b) over the SFBA region	7-58
Figure 7-46.	CAMx/SAPRC99 simulated ozone on July 12, 1999 at 1400 PST	
	(a) over the entire domain and (b) over the SFBA region	7-59
Figure 7-47.	Scatter diagrams of observed ozone vs. predicted ozone in the	
	SFBA region on July 11 and 12, 1999 using (a) the CARB's	
	MM5/MRF meteorology, and (b) the BAAQMD's MM5/Eta meteorology?	7-60
Figure 7-48.	Scatter diagrams of observed ozone vs. predicted ozone in the	
	Sacramento region on July 11 and 12, 1999 using (a) the	
	CARB's MM5/MRF meteorology, and (b) the BAAQMD's	
	MM5/Eta meteorology	7-61
Figure 7-49.	Scatter diagrams of observed ozone vs. predicted ozone in the	
	SJV region on July 11 and 12, 1999 using (a) the CARB's	
	MM5/MRF meteorology, and (b) the BAAQMD's MM5/Eta meteorology?	7-62
Figure 7-50.	EPA guidance statistics for daily ozone performance on	
	July 11 and 12, 1999 in SFBA (top), Sacramento (middle), and	
	SJV (bottom), for two CAMx simulations using different	
	meteorology. The BAAQMD's CAMx simulation using MM5/Eta	
	meteorology from July 31, 2000 is shown for comparison	7-64
Figure 7-51.	Daily photochemical model performance statistics for the	
	July 10-12, 1999 episode using both CB-IV and SAPRC99	
	chemical mechanisms and the CARB MM5/MRF meteorology.	
	Statistics for the SFBA region	7-65
Figure 7-52.	Daily photochemical model performance statistics for the	
_	July 10-12, 1999 episode using both CB-IV and SAPRC99	
	chemical mechanisms and the CARB MM5/MRF meteorology.	
	Statistics for the Sacramento region	7-66
Figure 7-53.	Daily photochemical model performance statistics for the	
	July 10-12, 1999 episode using both CB-IV and SAPRC99	
	chemical mechanisms and the CARB MM5/MRF meteorology.	
	Statistics for the entire SJV region	7-67